

2/2-, 3/2- and 4/2-way poppet directional valves, solenoid actuated

Type M-.SEW 6

Nominal size 6

Series 3X

Maximum operating pressure 420/630 bar

Maximum flow 25 L/min



H4232+H4236

Type M-3SEW 6 U3X/420MG24N9K4 with plug-in connector and
Type M-4SEW 6 D3X/420MG24N9K4 with plug-in connector

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Features

- Direct actuated directional poppet valve, solenoid actuated
- Porting pattern to DIN 24 340 form A, ISO 4401 and CETOP–RP 121 H, subplates to catalogue sheet RE 45 052 (separate order)
- Closed port is leak-free
- Switching is ensured even after long periods of being under pressure
- Air gap DC solenoids with removable coil (AC voltages possible via rectifier)
- Solenoid coil can be rotated by 90°
- Individual electrical connection
- With protected hand override, optional

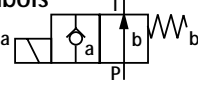
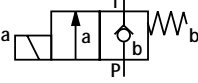
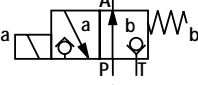
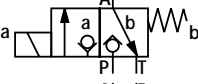

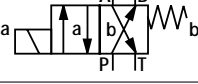
Ordering details

| | | | | | | |
|----|-----|---|-----|---|-----|---|
| M- | SEW | 6 | 3X/ | M | K4/ | * |
|----|-----|---|-----|---|-----|---|

| | |
|------------------|-----|
| 2 actuator ports | = 2 |
| 3 actuator ports | = 3 |
| 4 actuator ports | = 4 |

Poppet valve

Nominal size 6 = 6

| Actuator ports | 2 | 3 | 4 | |
|----------------------------------------------------------------------------------|---------------|---|---|-----|
| Symbols | | | | |
|  | ● | - | - | = P |
|  | ● | - | - | = N |
|  | - | ● | - | = U |
|  | - | ● | - | = C |
|  | - | - | ● | = D |
|  | - | - | ● | = Y |
| | ● = available | | | |

Series 30 to 39 = 3X

(30 to 39: unchanged installation and connection dimensions)

Operating pressure up to 420 bar (fixing screws M5) = 420

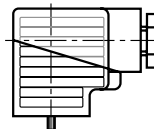
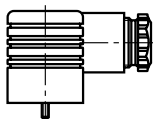
Operating pressure up to 630 bar (fixing screws M6) = 630

| AC supply (permissible voltage tolerance ± 10%) | Nominal voltage of the DC solenoid when used with an AC voltage | Order detail |
|----------------------------------------------------------|--------------------------------------------------------------------------|-----------------|
| 110 V - 50/60 Hz | 96 V | G96 |
| 120 V - 60 Hz | 110 V | G110 |
| 230 V - 50/60 Hz | 205 V | G205 |

Preferred types and standard components are highlighted in the RPS (Rexroth Price list Standard).

Ordering details: plug-in connector to DIN 43 650 A and ISO 4400 plug connection "K4"

For further plug-in connectors see RE 08 006



Material no.

| Valve side | Colour | Without circuitry | With indicator light 12 ... 240 V | With rectifier 12 ... 240 V | With indicator light and Z-diode protective circuit 24 V |
|------------|--------|-------------------|--------------------------------------|--------------------------------|----------------------------------------------------------------|
| a | grey | 00074683 | - | - | - |
| a/b | black | - | 00057292 | 00313933 | 00310995 |

Further details in clear text

No code = NBR seals

V = FKM seals

(other seals on request)

⚠ Attention!

The compatibility of the seals and pressure fluid has to be taken into account!

No code = Without cartridge check valve, without throttle insert

P = With cartridge check valve

B12 = Throttle Ø 1.2 mm

B15 = Throttle Ø 1.5 mm

B18 = Throttle Ø 1.8 mm

B20 = Throttle Ø 2.0 mm

B22 = Throttle Ø 2.2 mm

Electrical connection

K4 ^{1:2} = Individual connection; with component plug DIN 43 650-AM2, without plug-in connector

N9 = With protected manual override

ohne Bez. = Without manual override

G24 = 24 V DC

G205 ²⁾ = 205 V DC

M = Solenoid (air gap) with removable coil

Note: Other types of actuators (e.g. pneumatic, hydraulic, rotary knob, rotary knob with lock, plunger, lever, roller lever) on request!

1) Plug-in connectors have to be ordered separately (see below).

2) For the connection to an AC supply a DC solenoid **must** be used which is controlled via a rectifier (see table on the left).

For individual connections a large plug-in connector with integrated rectifier can be used (separate order, see below).

Function, section: 2/2-, 3/2-way poppet valve

General:

The type M-.SEW directional valve is a solenoid actuated directional poppet valve. They control the start, stop and direction of a flow.

They basically consist of a housing (1), the solenoids (2), the hardened valve system (3) and the ball(s) (4) as the closing element.

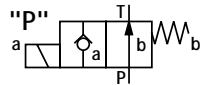
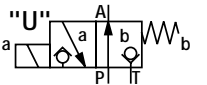
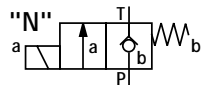
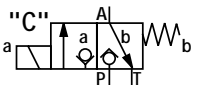
Basic principle:

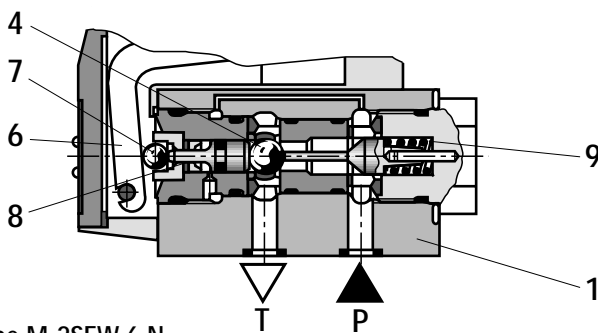
In the initial position the ball (4) is pressed onto the seat by the spring (9), and in the switched position by the solenoid (2). The solenoid (2) force acts via the lever (6) and the ball (7) on the actuator pin (8), which is sealed on two sides. The chamber between the two sealing elements is connected with port P. The valve system (3) is thereby pressure balanced with regard to the actuating forces (solenoid or return spring). The valves can, therefore, be used up to a pressure of 630 bar.

Note:

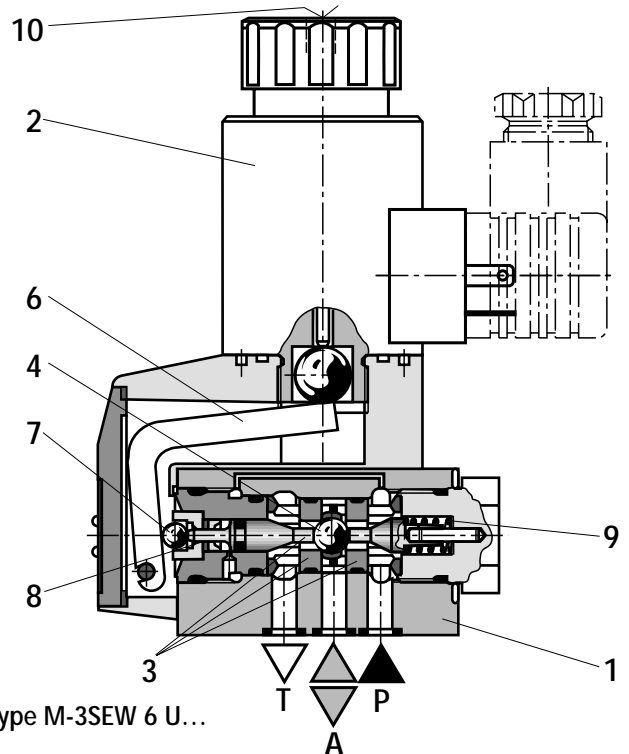
- The 3/2-way poppet valves have a "negative switching overlap". Therefore, port T must always be connected. This means that during the switching process – from the start of opening one valve seat to the closing of the other seat – all of the ports P–A–T are connected with each other. This, however, takes place in such a short space of time that in most applications it is irrelevant.
- The hand override (10) makes it possible to switch the valve without energising the solenoids.
- Care has to be taken to ensure that the stated maximum flows are not exceeded! If necessary a cartridge throttle for flow limitation has to be fitted (see below).

The following possibilities are obtainable via the seat orientation:

| | 2/2-way poppet valve | 3/2-way poppet valve |
|--------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Symbol |  |  |
| Initial position | P and T connected | P and A connected, T closed leak-free |
| Switched position | P closed leak-free | P closed leak-free, A and T connected |
| Symbol |  |  |
| Initial position | P closed leak-free | P closed leak-free, A and T connected |
| Switched position | P and T connected | P and A connected, T closed leak-free |



Type M-2SEW 6 N...



Type M-3SEW 6 U...

Cartridge throttle

The use of the cartridge throttle is necessary when, due to operational conditions during the switching process, flows can occur that exceed the valve performance limits.

Example:

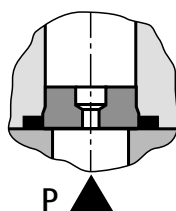
- Accumulator operation,
- Use as a pilot valve with internal pilot oil supply.

3/2-way poppet valve

The cartridge throttle is fitted into port P of the poppet valve.

4/2-way poppet valve (see page 4)

The cartridge throttle is fitted into port P of the plus-1 plate.



Cartridge check valve

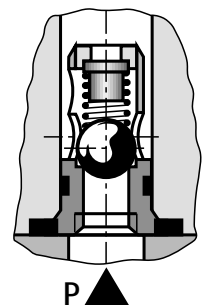
The cartridge check valve allows free flow from P to A and provides leak-free closure from A to P. For examples, see page 11.

3/2-way poppet valve

The cartridge check valve is inserted into port P of the poppet valve.

4/2-way poppet valve (see page 4)

The cartridge check valve is inserted into port P of the plus-1 plate.



Function, section, schematic illustration: 4/2-way poppet valve

In conjunction with a sandwich plate, a **plus-1 plate**, under the 3/2-way poppet valve this valve can be used as 4/2-way poppet valve.

Due to the use of the plus-1 plate and the arrangement of the seats, the following combinations are possible:

Function of the plus-1 plate:

Initial position:

The main valve is not actuated. The spring (9) holds the ball (4.1) on the seat (11). Port P is closed and A is connected to T. In addition, a control line runs from A to the large area of the control spool (12), which is thus unloaded to tank. The pressure applied via P now moves the ball (13) onto seat (14). Thus, P is connected to B and A to T.

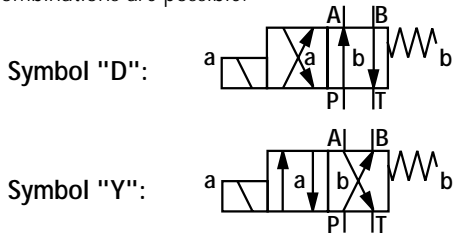
Transition position:

When the main valve is operated, the ball (4.2) is pushed against the spring (9) and then pressed onto the seat (15). Port T is then blocked, P, A and B are connected to each other for a short time.

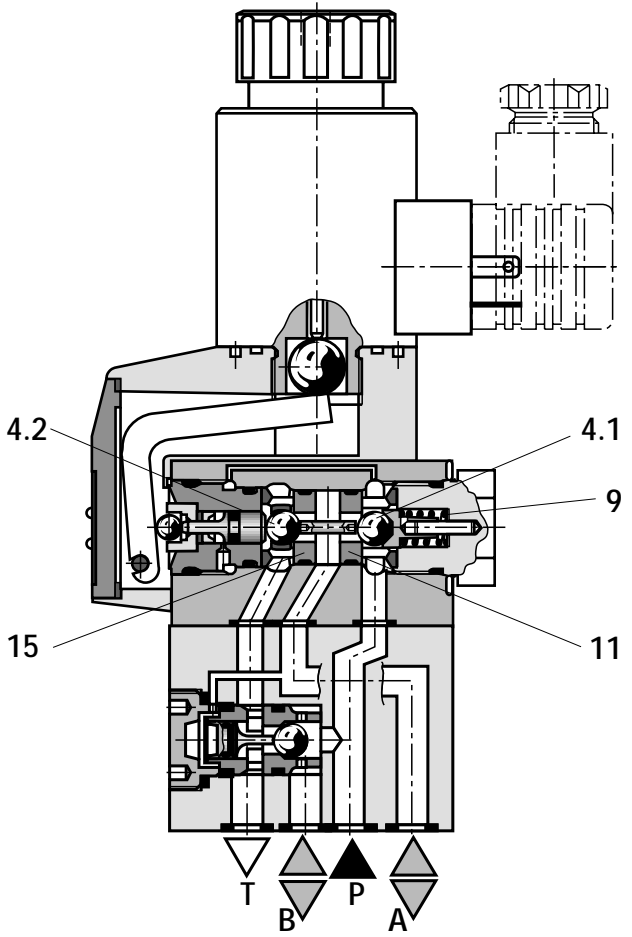
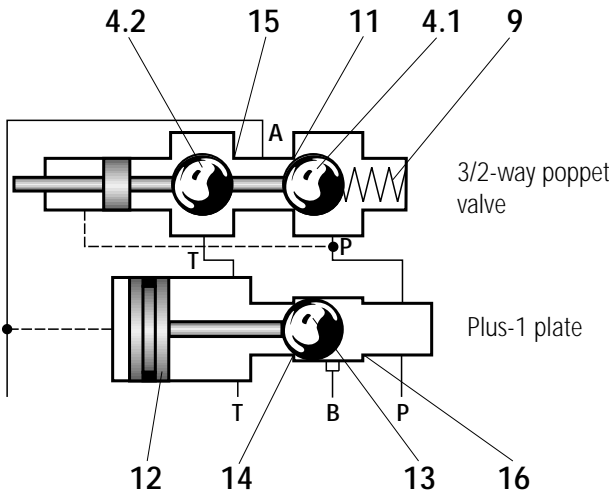
Switched position:

P is connected to A. As the pump pressure acts via A on the large area of the control spool (12), ball (13) is pushed onto seat (16). Thus, B is connected to T and P to A. Ball (13) in the plus-1 plate has a "positive switching overlap".

In order to avoid pressure intensification when single rod cylinders are used, the annulus area of the cylinder must be connected to A.



Schematic illustration: initial position



Type M-4SEW 6 Y...

Technical data (for applications outside these parameters, please consult us!)

General

| | | |
|--------------------------|----------------------|----------|
| Installation | | optional |
| Max. ambient temperature | °C | 50 |
| Weight | 2/2-way poppet valve | kg 1.5 |
| | 3/2-way poppet valve | kg 1.5 |
| | 4/2-way poppet valve | kg 2.3 |

Hydraulic data

| | | |
|------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Max. operating pressure | bar | see table on page 7 |
| Max. flow | L/min | 25 |
| Pressure fluid | | Mineral oil (HL, HLP) to DIN 51 524 ¹⁾ ; Fast bio-degradable pressure fluids to VDMA 24 568 (also see RE 90 221); HETG (rape seed oil) ¹⁾ ; HEPG (Polyglycols) ²⁾ ; HEES (synthetic esters) ²⁾ ; other pressure fluids on request |
| 1) suitable for NBR and FKM seals | | |
| 2) only suitable for FKM seals | | |
| Pressure fluid temperature range | °C | – 30 to + 80 (with NBR seals) |
| | | – 20 to + 80 (with FKM seals) |
| Viscosity range | mm ² /s | 2.8 to 500 |
| Degree of contamination | | Maximum permissible degree of contamination of the pressure fluid is to NAS 1638 class 9. We, therefore, recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$. |

Electrical data

| Type of voltage | | DC | AC |
|-------------------------------------|----------|---------------------------------------|--------------------------------------------------------------|
| Available voltages ³⁾ | V | 12, 24 , 42, 96, 110, 205, 220 | only possible via rectifier (see ordering details on page 2) |
| Voltage tolerance (nominal voltage) | % | ±10 | |
| Power consumption | W | 30 | |
| Duty | | continuous | |
| Switching time to ISO 6403 | | see table below | |
| Switching frequency | cycles/h | 15000 | |
| Protection to DIN 40 050 | | IP 65 | |
| Max. coil temperature ⁴⁾ | °C | 150 | |

³⁾ Special voltages on request

⁴⁾ Due to the surface temperatures which occur on the solenoid coils, the European standards EN563 and EN982 must be taken into account!

When connecting the electrics, the protective conductor (PE ≡) must be connected according to the relevant regulations.

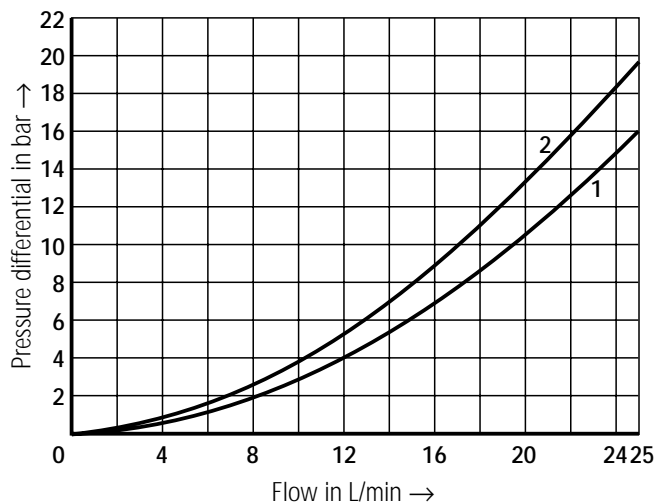
Switching time t in ms (installation: solenoid vertical)

| Pressure p in bar | Flow q_v in L/min | DC solenoid | | | | | | DC solenoid + rectifier | | | | | |
|---------------------|---------------------|-----------------------|----|----|----|----|----|-------------------------|----|----|----|----|----|
| | | Symbols U, C, D, Y | | | | | | Symbols U, C, D, Y | | | | | |
| | | Without tank pressure | | | | U | D | Without tank pressure | | | | U | D |
| | | U | C | D | Y | C | Y | U | C | D | Y | C | Y |
| 140 | 25 | 25 | 30 | 25 | 30 | 10 | 10 | 30 | 40 | 30 | 40 | 35 | 35 |
| 280 | 25 | 25 | 30 | 25 | 30 | 10 | 10 | 35 | 45 | 35 | 45 | 40 | 40 |
| 320 | 25 | 25 | 35 | 25 | 35 | 10 | 10 | 35 | 50 | 35 | 50 | 40 | 40 |
| 420 | 25 | 25 | 35 | 25 | 35 | 10 | 10 | 40 | 50 | 40 | 50 | 50 | 50 |
| 500 | 25 | 25 | 40 | 25 | 40 | 10 | 10 | 40 | 55 | 40 | 55 | 50 | 50 |
| 600 | 25 | 25 | 40 | 25 | 40 | 10 | 10 | 40 | 55 | 40 | 55 | 55 | 55 |

Characteristic curves (measured at $\nu = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50 \text{ }^\circ\text{C}$)

Δp - q_v -characteristic curves

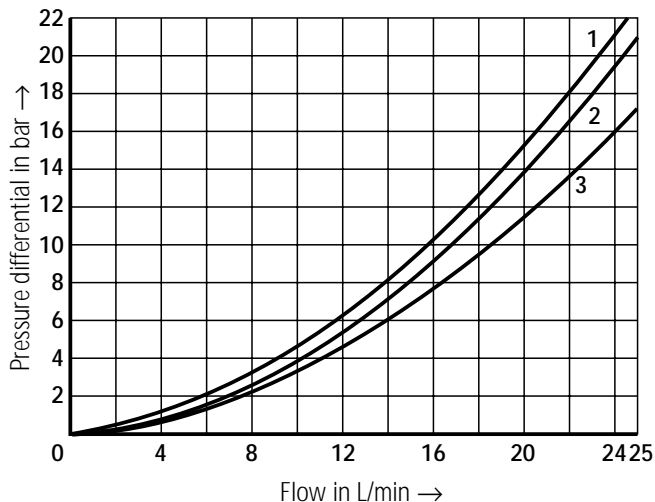
2/2-way poppet valve



- 1 M-2SEW 6 N ..., P to T
- 2 M-2SEW 6 P ..., P to T

Δp - q_v -characteristic curves

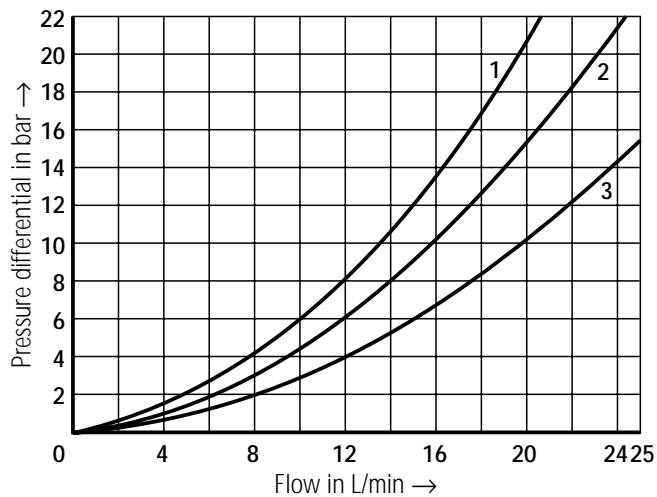
3/2-way poppet valve



- 1 M-3SEW 6 U_C ..., A to T
- 2 M-3SEW 6 U ..., P to A
- 3 M-3SEW 6 C ..., P to A

Δp - q_v -characteristic curves

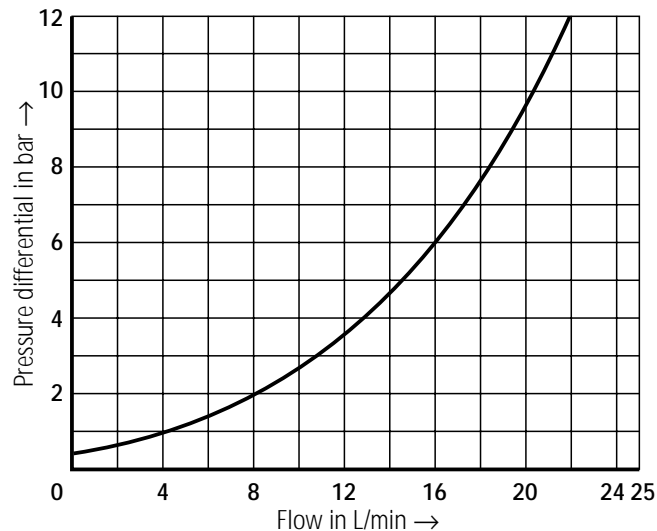
4/2-way poppet valve



- 1 M-4SEW 6 D_Y ..., A to T
- 2 M-4SEW 6 D_Y ..., P to A
- 3 M-4SEW 6 D_Y ..., P to B, B to T

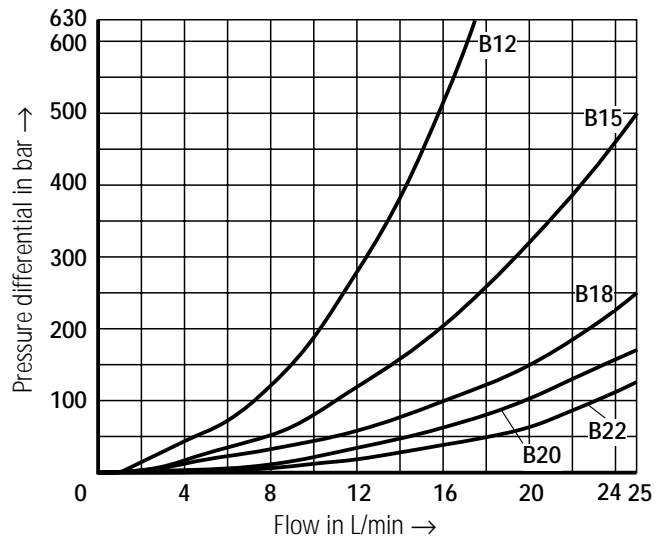
Δp - q_v -characteristic curve

Cartridge check valve



Δp - q_v -characteristic curves

Throttle insert



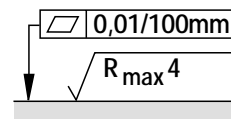
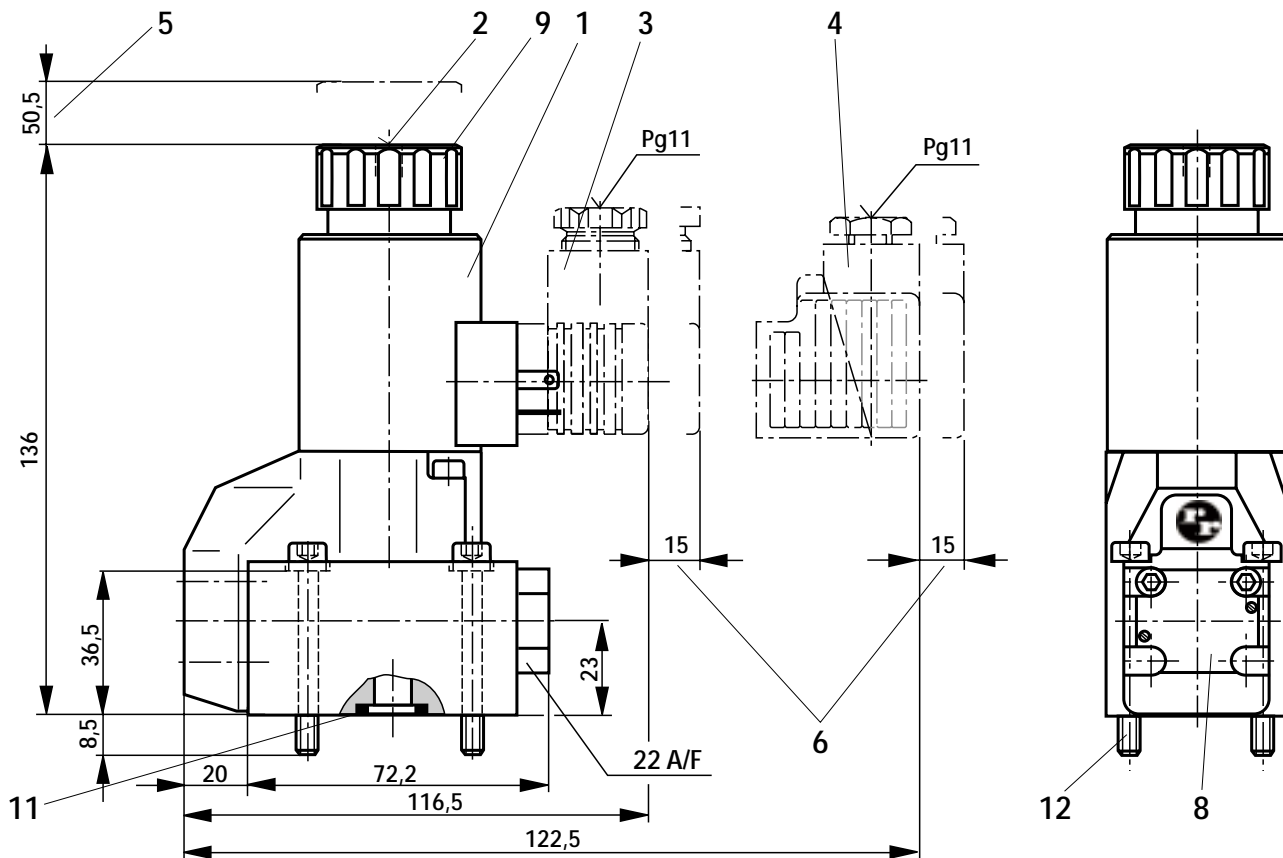
Performance limits (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50 \text{ }^\circ\text{C}$)

| | Symbol | Comments | Operating pressure in bar | | | | Flow in L/min |
|-------------------------------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------|---------|-----|---------------|
| | | | P | A | B | T | |
| 2-way circuit | "P" | Pressure to $P \geq T$ | 420/630 | | | 100 | 25 |
| | "N" | | 420/630 | | | 100 | 25 |
| 3-way circuit | "U" | Pressure to $P \geq A \geq T$ | 420/630 | 420/630 | | 100 | 25 |
| | "C" | | 420/630 | 420/630 | | 100 | 25 |
| 2-way circuit (only for unloading function) | "U" | Before switching from the initial position to the switched position, pressure must be present in port A. Pressure at $A \geq T$ | | 420/630 | | 100 | 25 |
| | "C" | Pressure at $A \geq T$ | | 420/630 | | 100 | 25 |
| 4-way circuit (flow is only possible in the direction of the arrow!) | "D" | Single ball valve (symbol „U“) in conjunction with a plus-1 plate $P > A \geq B > T$ | 420/630 | 420/630 | 420/630 | 100 | 25 |
| | "Y" | Two ball valve (symbol „C“) in conjunction with a plus-1 plate $P > A \geq B > T$ | 420/630 | 420/630 | 420/630 | 100 | 25 |

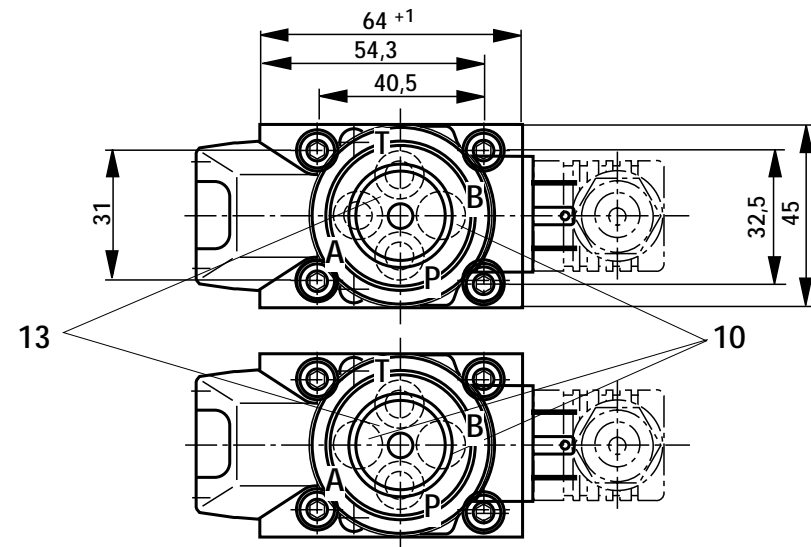
⚠ Attention!

Please take into account the „general guidelines“ stated on page 10!

The performance limit was determined with the solenoids at operating temperature, 10% under voltage and with the tank not pressurised.



Required surface finish of the mating piece



- 1 Solenoid "a" (plug-in connector colour grey)
- 2 Protected hand override "N9"
- 3 Plug-in connector **without** circuitry to DIN 43 650 ¹⁾
- 4 Plug-in connector **with** circuitry to DIN 43 650 ¹⁾
- 5 Space required to remove the coil
- 6 Space required to remove the plug-in connector
- 8 Name plate

- 9 Fixing nut, tightening torque $M_A = 4 \text{ Nm}$
- 10 **⚠ Attention!**
On 3/2-way poppet valves (420 bar version), port B is a blind counterbore. On 2/2-way poppet valves (420 bar version) ports A and B are blind counterbores.
- 11 R-rings 9.81 x 1.5 x 1.78 for ports A, B and T
R-ring 11.18 x 1.6 x 1.78 for port P

12 Valve fixing screws

- **420 bar version**
4 off, M5 x 45 DIN 912-10.9, $M_A = 8.9 \text{ Nm}$
- **630 bar version**
4 off, M6 x 45 DIN 912-10.9, $M_A = 15.5 \text{ Nm}$

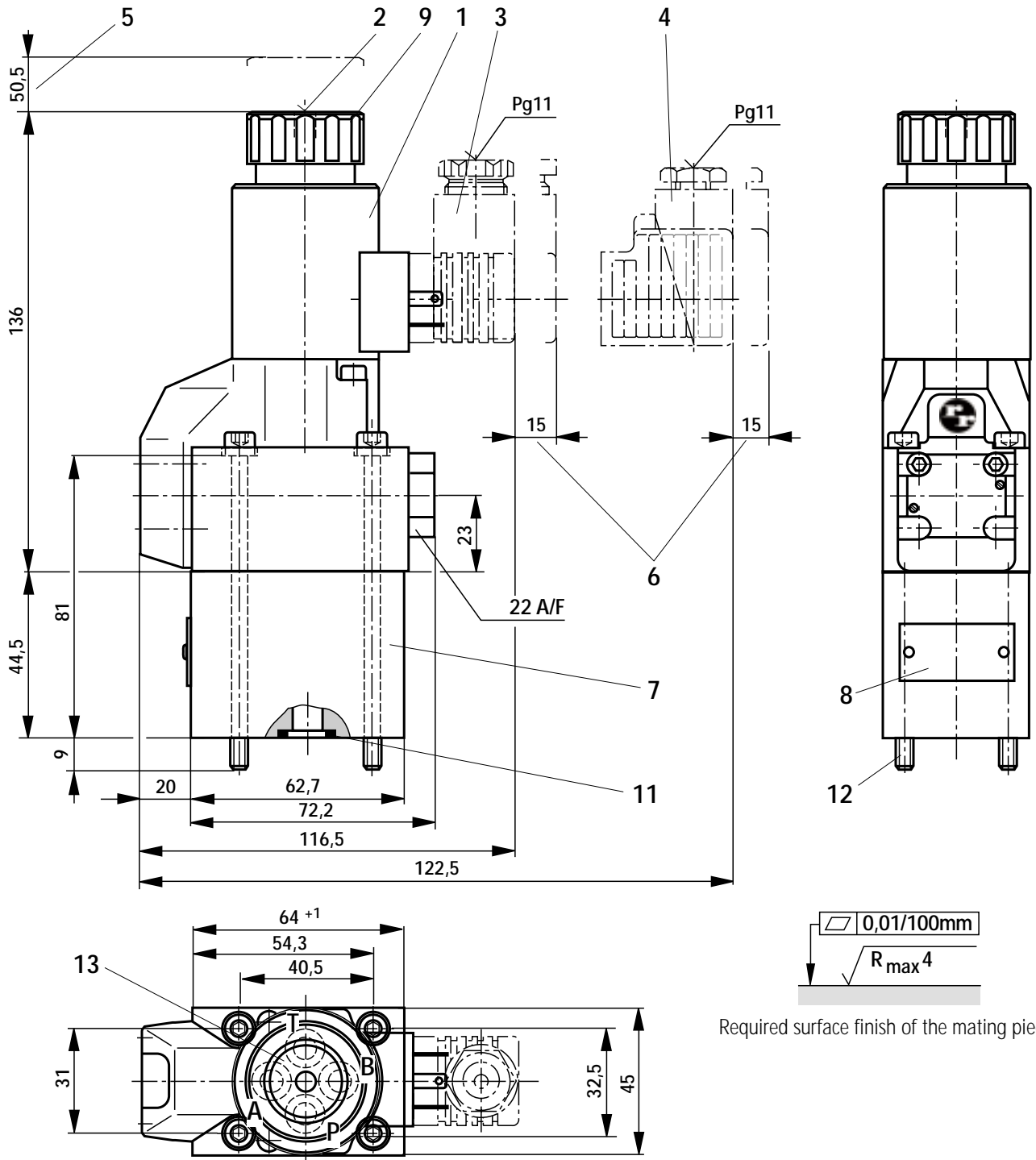
are included within the scope of supply.

13 Porting pattern to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H

Subplates

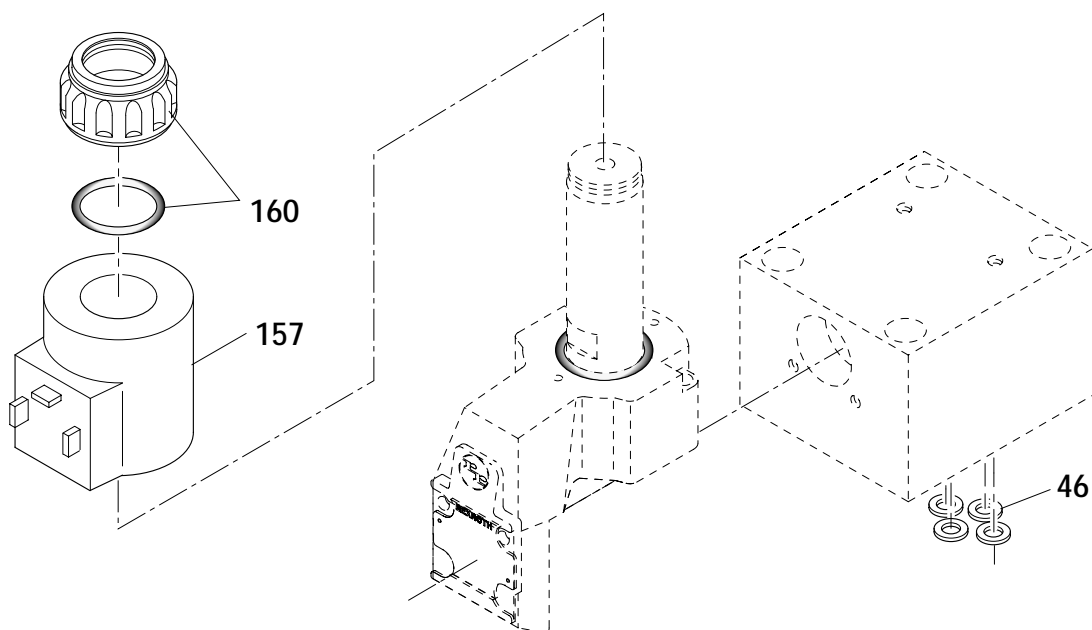
- **420 bar version**
G 341/01 (G1/4)
G 342/01 (G3/8)
G 502/01 (G1/2)
to catalogue sheet RE 45 052
- **630 bar version**
G 576/01 (G1/4)
G 577/01 (G3/8)
must be ordered separately.

¹⁾ Must be ordered separately, see page 2.



Required surface finish of the mating piece

- 1 Solenoid "a" (plug-in connector colour grey)
 - 2 Protected hand override "N9"
 - 3 Plug-in connector **without** circuitry to DIN 43 650 ¹⁾
 - 4 Plug-in connector **with** circuitry to DIN 43 650 ¹⁾
 - 5 Space required to remove the coil
 - 6 Space required to remove the plug-in connector
 - 7 Plus-1 plate
 - 8 Name plate
 - 9 Fixing nut, tightening torque $M_A = 4 \text{ Nm}$
 - 11 R-rings 9.81 x 1.5 x 1.78 for ports A, B and T
R-ring 11.18 x 1.6 x 1.78 for port P
 - 12 Valve fixing screws
 - 420 bar version
4 off, M5 x 90 DIN 912-10.9, $M_A = 8.9 \text{ Nm}$
 - 630 bar version
4 off, M6 x 90 DIN 912-10.9, $M_A = 15.5 \text{ Nm}$
 are included within the scope of supply.
 - 13 Porting pattern to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H
Subplates
 - 420 bar version
G 341/01 (G1/4)
G 342/01 (G3/8)
G 502/01 (G1/2)
to catalogue sheet RE 45 052
 - 630 bar version
G 576/01 (G1/4)
G 577/01 (G3/8)
must be ordered separately.
- ¹⁾ Must be ordered separately, see page 2.



Spare parts – solenoid

| Item | Designation | DC | |
|------|-------------------------------------------------------------------------------------------------------------------------|---------|--------------|
| | | Voltage | Material no. |
| 157 | Coil for individual connection | 12 V | 00021388 |
| | | 24 V | 00021389 |
| | | 96 V | 00021392 |
| | | 205 V | 00071036 |
| 160 | Seal kit – nut for pressure tube without hand override Seal kit – nut for pressure tube with protected hand override | | 00838254 |

Seal kit – valve

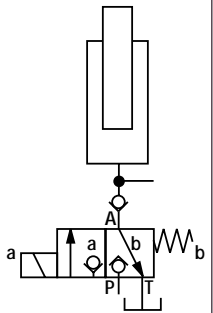
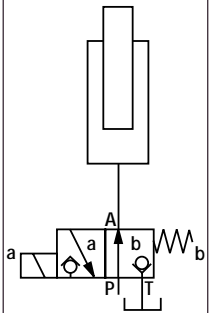
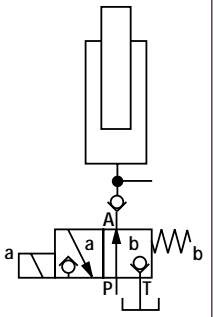
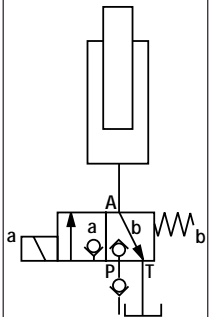
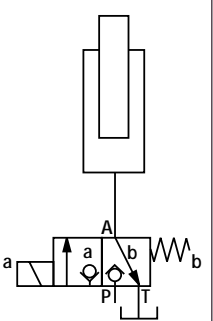
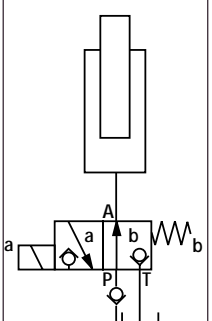
| Item | Sealing material | Material no. |
|------|------------------|--------------|
| 46 | NBR seals | 00075699 |
| | FKM seals | 00075700 |

General guidelines

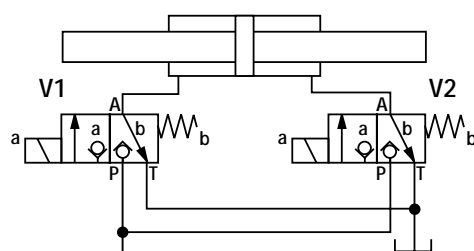
- In order to operate the valve safely and to hold it safely in the switched position, the pressure in P must be $\geq A \geq T$ (for design reasons).
- The ports P, A and T (3/2-way poppet valve) as well as P, A, B and T (4/2-way poppet valve) are positively assigned to their individual functions. They must not be interchanged or plugged. Flow is only permitted in the direction of the arrow.
- When using the plus-1 plate (4/2-way function) the following lower operating values must be taken into account:
 $p_{\min} = 8 \text{ bar}$; $q_v > 3 \text{ L/min}$.
- The specified maximum flow must not be exceeded.

Application examples

These examples serve **only to explain** the possibilities offered by the poppet valve. They do not include the complete function.

| | | | |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Symbol "C"</p>  | <p>2/2-way circuit with a two poppet valve and check valve at port A</p> <p>The check valve must be installed in the pipework.</p> <p>Initial position: Flow blocked, maximum pressure permissible. Pressure is held in the actuator, even when the pump is switched off, due to the check valve at port A.</p> <p>Switched position: Free-flow, maximum pressure permissible. Leakage drained via port T. The only leakage occurring is that which flows to T during the switching process.</p> | <p>Symbol "U"</p>  | <p>3/2-way circuit with a single poppet valve</p> <p>Initial position: Lifting Holding only due to limitation of travel and pressure in port P.</p> <p>Switched position: Lowering</p> |
| <p>Symbol "U"</p>  | <p>2/2-way circuit with a single poppet valve and check valve at port A</p> <p>The check valve must be fitted in the pipework.</p> <p>Initial position: Free-flow, maximum pressure permissible. Pressure is held in the actuator, even when the pump is switched off, due to the check valve at port A.</p> <p>Switched position: Flow blocked, maximum pressure permissible. Leakage drained via port T. The only leakage occurring is that which flows to T during the switching process.</p> | <p>Symbol "C"</p>  | <p>3/2-way circuit with a two poppet valve and cartridge check valve in port P</p> <p>The check valve is fitted in the P port of the 3/2-way poppet valve.</p> <p>Initial position: Lowering</p> <p>Switched position: Lifting</p> <p>The load can be held in any position while the pump is switched off and the solenoid energised.</p> |
| <p>Symbol "C"</p>  | <p>3/2-way circuit with a two poppet valve</p> <p>Initial position: Lowering</p> <p>Switched position: Lifting</p> <p>Holding only due to limitation of travel and pressure in port P.</p> | <p>Symbol "U"</p>  | <p>3/2-way circuit with a single poppet valve and cartridge check valve in port P</p> <p>The check valve is fitted into the P port of the 3/2-way poppet valve.</p> <p>Initial position: Lifting</p> <p>The load can be held in any position while the pump is switched off.</p> <p>Switched position: Lowering</p> |

Symbol "C"



4/3- (4/4-) way circuit with a 2 two poppet valves

V1 and V2 in the initial position: Both cylinder sides are connected to the tank port.

V2 in the switched position: The piston moves to the left

V1 in the switched position: The piston moves to the right

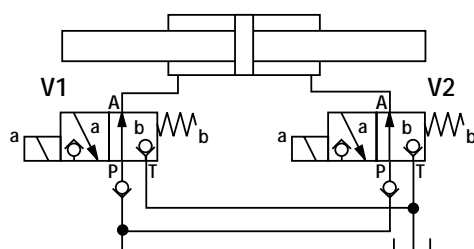
V1 and V2 in the switched position: Both cylinders sides are connected to the pump port.

Rapid traverse is possible when a single rod cylinder with an area ratio of 2 : 1, is used.

⚠ Attention!

When using single rod cylinders, the performance limit (double flow) and the maximum permissible operating pressure (pressure intensification) of the valve must be taken into account.

Symbol "U"



4/3- (4/4-) way circuit with a 2 two poppet valves and cartridge check valve in port P of the 3/2-way poppet valves

V1 and V2 in the initial position: The piston is locked externally to prevent movement.

V2 in the switched position: The piston moves to the right

V1 in the switched position: The piston moves to the left

V1 and V2 in the switched position: Both cylinder sides are connected to the tank port.

⚠ Attention!

When using single rod cylinders, the performance limit (double flow) and the maximum permissible operating pressure (pressure intensification) of the valve must be taken into account!

